Cuddy Valley Groundwater Basin

- Groundwater Basin Number: 5-84
- County: Kern
- Surface Area: 3,500 acres (5 square miles)

Basin Boundaries and Hydrology

Cuddy Valley is an elongate, east-west trending, fault-controlled basin in the San Emigdio Mountains of southernmost Kern County. The elevation ranges from 5,400 to 5,800 feet. It is bound to the north by the San Andreas Fault and Tecuya Ridge beyond, and to the south by the Cuddy Saddle Fault (a splay of the San Andreas) and the flank of Mount Pinos. The basin is bound to the west by a drainage divide between the east fork of San Emigdio Creek and Cuddy Creek; it is bound to the east by Peanut Hill, a tectonic ridge formed at the intersection of the Cuddy Saddle Fault and the San Andreas Fault (Davis 1983).

The San Andreas Fault zone is identified in the valley by a linear depression parallel to the northern basin boundary and fault-related land forms including pressure ridges and sag ponds (Barto 1985). The most prominent sag ponds exist at the valley's east (low) end. Along the eastern portion of Cuddy Valley, immediately south of the San Andreas Fault zone, the valley floor rises rapidly to form a plateau or mesa area approximately 100 feet higher than the elevation of the valley trough. This is the site of the Piñon Pines Estates development. Surface drainage in the basin is eastward along Cuddy Creek The range of annual precipitation is 14 to 16 inches.

Hydrogeologic Information

Water Bearing Formations

The water bearing units of the Cuddy Valley basin are composed of older alluvial and terrace deposits, and younger alluvium. Combined, these units have a probable thickness exceeding 450 feet (Barto 1985). The alluvium and terrace deposits are floored by non-water bearing crystalline bedrock or older undifferentiated Tertiary terrestrial and marine sediments. These older sediments also form the core of a small set of hills (Piñon Hills) at the east end of the valley.

Barto (1985) divides the valley into two separate groundwater regimes; the northern trough basin (north of the San Andreas Fault zone) and the southern mesa basin (south of the fault zone). Groundwater in the southern basin is mostly unconfined while the northern basin is under artesian conditions. Specific yield values for the northern basin area (20 percent of the entire basin) are 17 percent and for the southern mesa basin (80 percent of the entire basin) are 9.1 percent (Barto 1985). This gives an estimated average specific yield of 10.7 percent.

Restrictive Structures

Groundwater flow in the Cuddy Valley basin is complicated by fault barriers, but is ultimately eastward toward the natural outlet for both surface and groundwater. At the eastern end of the northern trough basin, groundwater either flows within the alluvium covering the fault trace or rises to the surface forming the sag ponds common to the lower valley. Groundwater flow in the eastern portion of the southern mesa basin is eastward and is subject to surface discharge in springs on the south and east sides of the Piñon Pines development (Barto 1985).

Recharge Areas

Direct percolation of precipitation forms the majority of groundwater recharge for the basin (Barto 1988). Some natural recharge through seepage from surrounding bedrock also occurs. Recharge from septic systems associated with the Piñon Pines and Pineridge developments supplement this natural recharge.

Groundwater Storage

Groundwater Storage Capacity. Total storage capacity in 77,000 acre-feet (Barto 1988).

Groundwater in Storage. There are no values in the referenced literature for the amount of groundwater stored in the basin.

Groundwater Budget (Type A)

A detailed budget from 1988 exists for this basin (Barto 1988). Values for natural and artificial recharge are 375 acre-feet (Barto 1988) and 29 acre-feet (from septic systems; Barto 1985) respectively. Applied water recharge accounts for 56 acre-feet of basin inflow (Barto 1988). Subsurface inflow is 50 acre-feet (Barto 1988). This gives a total basin inflow of 510 acre-feet. Annual urban extraction equals 90 acre-feet (PPMWC 2000). Annual agricultural extraction and other extractions account for 140 acre-feet (Barto 1985) and 80 acre-feet (evaporation losses; Barto 1988) of the outflow, respectively. Subsurface outflow is 56 acre-feet (Barto 1988). This gives a total basin outflow value of 366 acre-feet.

Groundwater Quality

Characterization. The characterization for this basin has not been determined. TDS values range from 325 to 645 mg/L, with an average value of 407 mg/L (based on 10 wells). EC values range from 440 to 1,030 µmhos, with an average value of 655 µmhos (based on 5 wells).

Impairments. High levels of iron and manganese were found in most eastern basin wells. The water quality of the western basin is significantly better (Barto 1988).

Water Quality in Public Supply Wells

Constituent Group[1]	Number of wells sampled[2]	Number of wells with a concentration above an MCL[3]
Inorganics – Primary	6	2
Radiological	6	1
Nitrates	10	0
Pesticides	5	0

VOCs and SVOCs	5	0
Inorganics – Secondary	6	4

[1] A description of each member in the constituent groups and a generalized discussion of the relevance of these groups are included in *California's Groundwater – Bulletin 118* by DWR (2003).
[2] Represents distinct number of wells sampled as required under DHS Title 22 program from 1994 through 2000.
[3] Each well reported with a concentration above an MCL was confirmed with a second detection above an MCL. This information is intended as an indicator of the types of activities that cause contamination in a given basin. It represents the water quality at the sample location. It does not indicate the water quality delivered to the consumer. More detailed drinking water quality information can be obtained from the local water purveyor and its annual Consumer Confidence Report.

Well Characteristics

	Well yields (gal/min)	
Municipal/Irrigation	Range: 85 - 160	Average: 135 (3 well completion reports)
Domestic:	Range: 24 – 60	Average: 37 (5 well completion reports)
	Total depths (ft)	
Domestic	Range: 155 – 360	Average: 230 (8 well completion reports)
Municipal/Irrigation	Range: 200 – 300	Average: 270 (6 well completion reports)

Active Monitoring Data

Agency	**Parameter**	**Number of wells /measurement frequency**
PPMWC	Groundwater levels	3 Semi-annually
Department of Health Services	Title 22 water quality	3 Varies

Basin Management

Groundwater management:

Water agencies

Public	None
Private	None

References Cited

Barto, Ron. 1985. *Hydrogeologic Study for Cuddy Valley Specific Plan Amendment, Kern County, California*. Consultant Report, Ron Barto & Associates, Consulting Hydrogeologists, Inc. 9 p.

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Thomas L. 1983. "Late Cenozoic Structure and Tectonic History of the Western "Big Bend" of the San Andreas Fault and Adjacent San Emigdio Mountains". Ph.D. Dissertation, University of California, Santa Barbara. 564 p.

Piñon Pines Mutual Water Company (PPMWC). 2000. District file data and personal communication with Mr. Michael Cresse, Watermaster, on 06/28/00.

Additional References

Barto, Ron. 1986. *Addendum to Hydrogeologic Study for Cuddy Valley Specific Plan Amendment, Kern County, California*. Consultant Report, Ron Barto & Associates, Consulting Hydrogeologists, Inc 5 p.

Jennings, Charles W. and Rudolph G. Strand (compilers). 1969. Los Angeles Sheet of *Geologic Map of California*. California Division of Mines and Geology (CDMG). Scale 1:250,000.

Errata

Changes made to the basin description will be noted here.